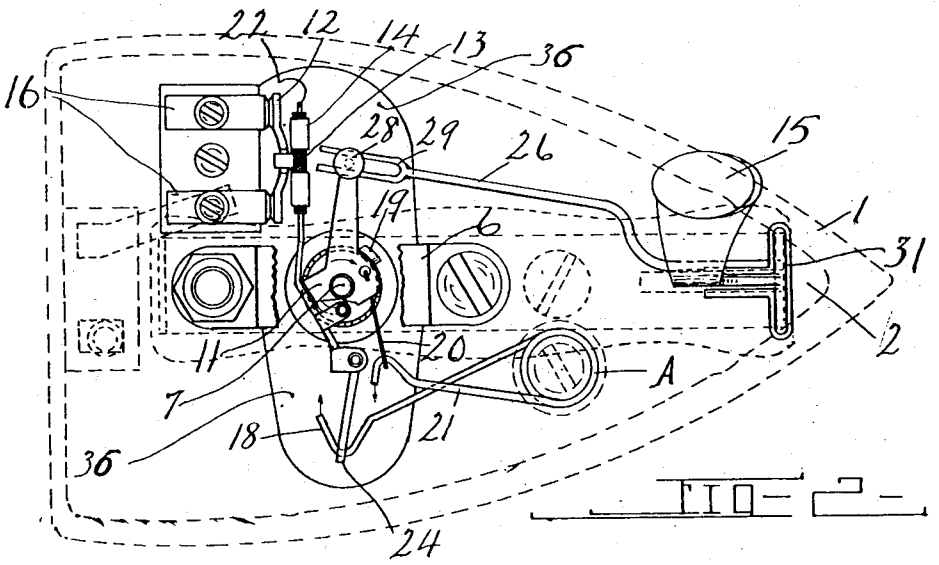
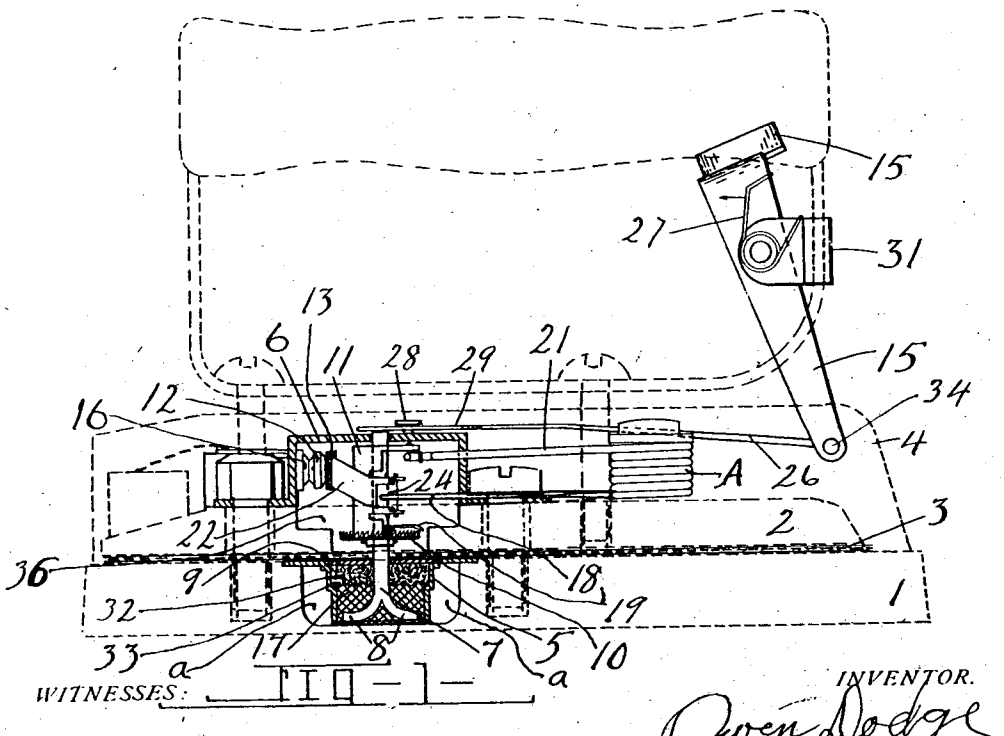
Oct. 11, 1927. 1,644,875

O. DODGE

OVERTEMPERATURE CONTROL FOR ELECTRIC SADIRONS

Filed June 15. 1923 2 Sheets-Sheet 1





WITNESSES:

INVENTOR.

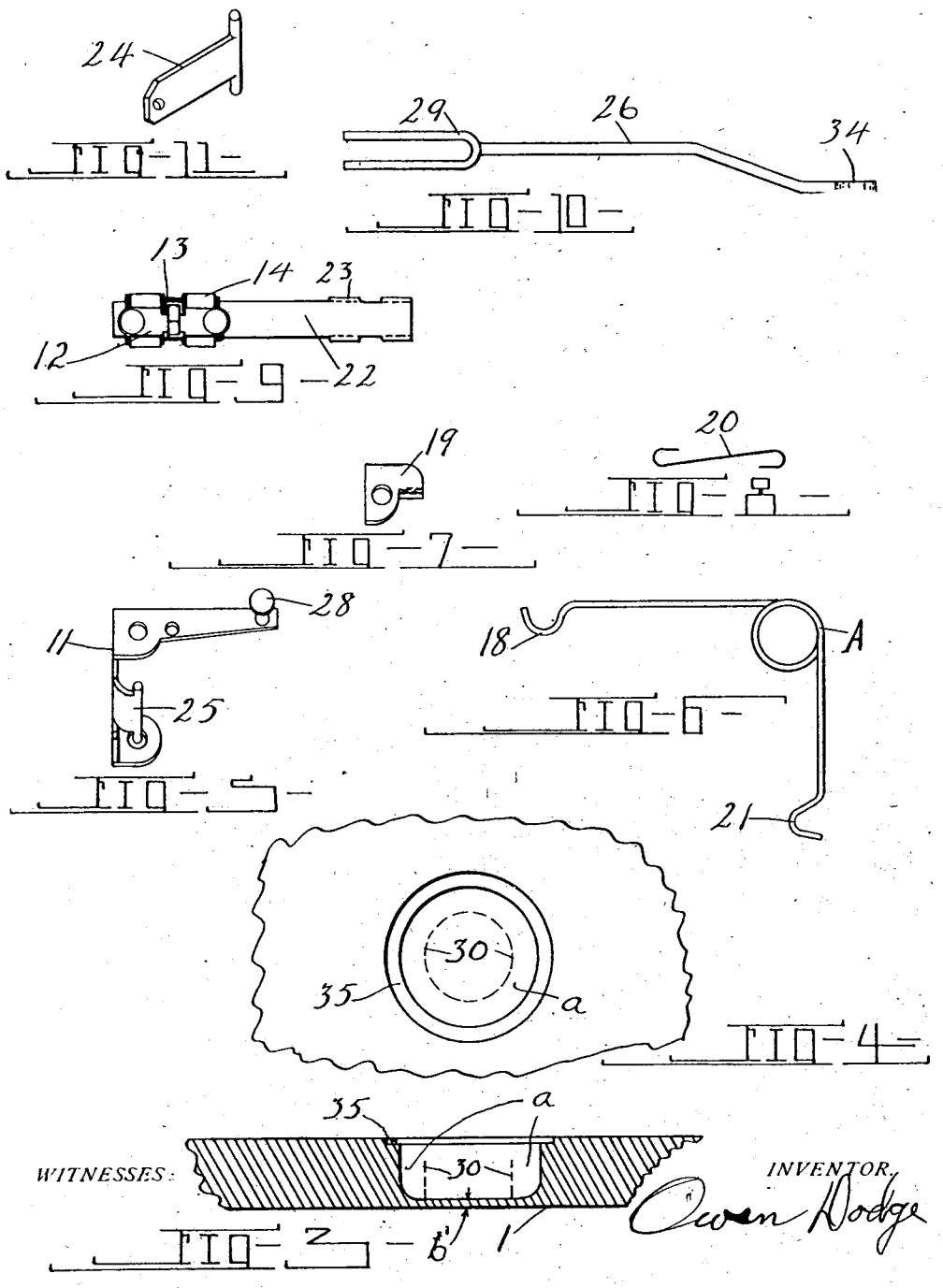
Owen Dodge

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OVERTEMPERATURE CONTROL FOR ELECTRIC SADIRONS

Filed June 15, 1923 2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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OVERTEMPERATURE CONTROL FOR ELECTRIC SADIRONS.

Application filed June 15, 1923. Serial No. 645,563.

My invention relates to thermally actuated overtemperature snap switches for use, in opening the circuit, in electrically heated sadirons, in which the thermally actuated element controlling the opening of the electric circuit is a fusible-alloy.

This invention is, primarily, an improvement upon my two copending applications, Serial No. 502,483, filed September 22, 1921, and Serial No. 580,930, filed August 10, 1922.

An object of this invention is, to provide a construction which will prevent the switch tripping during use on work taking a normal amount of heat from the working face of the iron.

Another object is, to so position the switch closing lever that, when desired to increase the temperature of the iron above normal, the switch may be held in the On position without fatigue or undue exertion upon the operator.

Another object of this invention is, to so balance the two opposing forces of the switch opening mechanism between the, otherwise, free ends of a common power spring, which provision automatically compensates for any and all differences in spring tensions. No matter whether the spring be weak or strong, the ratio of leverages remains constant, and therefore, the switch will function to open the electric circuit even though the spring may have weakened abnormally.

The foregoing are the three most essential functional advantages of this overtemperature release. There are structural and assembly advantages which tend to reduce the cost of manufacture when viewed in the light of commercial practicability.

The practical features of this invention which I believe to be patentably characteristic thereof are definitely set forth in the appended claims. The invention itself, the construction and functional mode of operation will be better understood from the following description taken in conjunction with the accompanying drawings, in which:—

Figure 1, is an elevation of a commercial sad-iron embodying my invention, in which the general outline of the iron is shown in dotted lines, and the improvements, very largely, in full lines. Figure 2, is a plan view, and as in Fig. 1, general outlines are in dotted lines, and improvements, very largely, in full lines. Figure 3, is a broken sectional elevation of a portion of a sole-plate illustrating the means for preventing the switch tripping during normal use. Figure 4, is a plan view of Figure 3. Figure 5, is a perspective view of the element 11. Figure 6, is a plan view of the power spring structure. Figure 7, is a perspective view of the pawl 19. Figure 8, is a plan view of the link element operatively connecting elements 12 and 21. Figure 9, is an elevation of the elements 12 and 22, assembled. Figure 10, is a plan view of the link which connects element 15, to element 11. Figure 11, is a perspective view of the toggle link 24.

Numeral 1, indicates the sole plate of the iron. 2, indicates the insole casting. 3, indicates the heating element. 4, indicates the cover of the iron. 5, indicates the alloy container. 6, indicates an inverted U shaped element forming the upper bearing for the shaft 7. 7, indicates the rotatable shaft, upon which the switch elements are mounted, one end of which is positioned in the fusible-alloy. 8, indicates the lower end of the shaft 7, and as illustrated in the drawings, is split and formed to provide an increased leverage contact with the bottom of the container 5, and the alloy 17. 9, indicates a cover for the alloy container 5, and which forms the lower bearing for the shaft 7. 10, indicates the ratchet element rigidly secured to the shaft 7. 11, indicates an element pivotally mounted upon the shaft 7, and to which the electric circuit closing elements of the switch mechanism are mounted. 12, indicates the circuit closing element loosely mounted upon the element 14, and insulated therefrom. 13, indicates insulation. 14, indicates the element which loosely supports the electric circuit closing element 12, and which is rigidly secured to element 22 but electrically insulafed therefrom. 15, indicates the switch closing lever pivotally mounted on the handle support of the iron. 16, indicates the live terminals of the switch and are bridged by the element 12 to close the electric circuit. 17, indicates the fusible-alloy which is retained in the container 5. 18, indicates the end of the power spring, A, which produces the quick make and break through the medium of the toggle links of the switch mechanism.

19, indicates the gravity operated pawl, which holds the switch in the On position until the alloy melts sufficiently to permit a rotary motion of the shaft 7. 20, indicates a link element connecting the element 11 to the end 21 of the power spring, A. 21, indicates the end of the power spring, A, which furnishes the power to rotate the shaft 7 against the combined restraining forces of the alloy and the end 18 of the power spring, A. 22, indicates one of the toggle elements of the switch mechanism. 23, indicates the pivotal end of element 22. 24, indicates the toggle element located between the element 22 and the end 18 of the power spring, A. 25, indicates a formed part of element 11 upon which the element 22 is pivotally mounted. 26, indicates a connecting link between the switch operating lever 15 and the element 11. 27, indicates a spring which tends to keep the switch operating lever 15 in the Off position. 28, indicates a stud on the lever arm of the element 11. 29, indicates a U shaped formed end on the link 26 which co-acts with elements 11, and 15 to close the switch. 30, indicates by dotted lines the position of the alloy container in the cored recess of the sole plate of the iron. 31, indicates the element to which the element 15 is pivotally secured. 32, indicates a heat resisting packing above the alloy in the alloy container 5. 33, indicates a perforated separator between the alloy and the packing 32, and which allows for the expansion of the alloy. 34, indicates the pivotal connection between elements 15, and 26. 35, indicates a recess in the sole plate for the reception of the flanged upper part of the alloy container 5. 36, indicates a cored space in the inner casting of the iron to provide working space for the switch mechanism. *a*, indicates an air space surrounding the alloy container 5, which reduces heat transference from the sole plate 1, to the alloy 17. *b*, indicates a very reduced thickness of the sole plate 1, under and directly surrounding the alloy container 5.

I have found by much practical research that an electric sad-iron embodying a thermally operated switch opening mechanism controlled by a fusible-alloy should contain the following, or equivalent, general constructions, and be adapted to function as herein specified.

First, I have found that the switch should remain closed during use on all work excepting the lighest and dryest materials, and therefore, on those materials producing the greatest radiation or consumption of heat from the working face of the sole-plate. To meet that requirement I have cored the sole plate in such manner as to provide a free air space surrounding the alloy container for the purpose of reducing the conductance of heat from the sole plate to the alloy. I have, also, reduced the thickness of the sole-plate under and directly surrounding the alloy container to a thinness which appears to be the limit in practical mechanical construction. I have found by experimental use that 1/16″ or less is not too thin for the purpose, and will stand normal usage without danger of breaking through. By reducing the thickness of the sole-plate at this point, as indicated in Fig. 3, it will be obvious that moving the iron over a relatively dry surface will produce ample radiation to prevent the alloy softening to the extent which will permit the switch to trip.

Second, to provide for conditions demanding an above normal temperature, I have placed the switch operating lever 15 at the left side of the operating handle of the iron, and directly under the thumb of the operator. This construction provides means whereby the operator may hold the switch in its On position and bring the sole-plate temperature of the iron to any desired degree above normal without undue exertion or fatigue on the operator.

Performing this operation while the iron is on a stand, then start ironing operations upon moderately damp goods, within a few seconds thereafter the thin part of the sole-plate under the fusible-alloy container will have cooled sufficiently to solidify the alloy enough to prevent the switch tripping and thereby breaking the electric circuit while the iron is being used. This feature is of great practical importance in that a switch operating at a normal temperature may be easily controlled to do overtemperature work when desired.

Third, I have found that for a switch of this general type or character to be reliable, the spring forces must be a single spring element one end of which functions as spring 18, the other end functioning as spring 21. To accomplish that result I have employed one spring and balanced the operating mechanism between its two free ends, and anchored the spring at its central portion. By this means the ratio of power for performing the two functions remains constant under any and all operating conditions, and under varying degrees of strength in any particular spring. Where more than one spring is employed for performing these two functions, weakening of one spring will surely overbalance the ratio between the two forces to the extent that the switch will fail to function at the critical period and a fire might be the result of such failure.

In the matter of construction assembly as illustrated in the accompanying drawings, the cover of the iron is slotted in such manner that the switch operating lever 15 may have the necessary free movement to close the electric circuit. The switch mechanism and the connecting link 26 being inclosed

within the body of the iron. The insole being cored as indicated at 36 to provide ample space for the switch mechanism.

The assembly is such that the normal tension of the spring A, is slightly downward, thus insuring that the ends 8 of the element 7 will always be in direct contact with the bottom of the alloy container 5.

In summing up this case: The invention resides very largely in the position of the switch operating lever 15: The balancing of the switch operating mechanisms between the free ends of a common power spring, A: The coring of the sole-plate of the iron in such manner that it provides a free air space surrounding the alloy container, and providing a thin portion of the sole-plate directly under and extending laterally from the bottom face of the alloy container: And in the formation and assembly of the shaft 7, such that it presses against the bottom of the alloy container at all times, which position, condition and form insure its being held against movement by the alloy under normal working conditions.

Having thus quite fully illustrated the construction, assembly, and functional operations of this invention, what I claim and wish to secure by Letters Patent of the United States is:

1. In overtemperature controls for electric sad-irons of the class described; the combination comprising a fusible-alloy overtemperature controlled switch mechanism connected to the free ends of a common power spring, said power spring being positioned within the body portion of said sad-iron.

2. In a thermally controlled overtemperature control for electric sad-irons; the combination comprising a thermostatic actuated electric circuit opening switch mechanism, a cored recess in the sole-plate of said sad-iron, said thermostatic element being held in direct contact with the bottom of said cored recess.

3. In an overtemperature control for electric sad-irons of the class described; the combination comprising a fusible-alloy controlled switch opening mechanism, the element containing said fusible alloy being positioned in a cored recess in the sole-plate of said iron, a free air space surrounding said alloy containing element, a relatively thin section of said sole-plate under said alloy containing element, and the bottom face of said containing element being held firmly against the upper face of said thin section in the bottom of said cored recess.

4. In an overtemperature control for electric sad-irons of the class described; the combination comprising a fusible-alloy overtemperature actuated electric circuit opening mechanism connected to the otherwise free ends of a common power spring having a loosely connected thumb actuated switch closing lever pivotally connected to the outside structure of said sad-iron.

5. In overtemperature controls for electric sad-irons of the class described; the combination comprising a fusible-alloy actuated electric circuit opening mechanism connected to the otherwise free ends of a common power spring having a loosely connected thumb operated switch closing lever pivotally connected to the operating handle of the sad-iron.

6. In overtemperature controls for sad-irons of the class described; the combination comprising a fusible-alloy overtemperature actuated electric circuit opening switch mechanism connected to the otherwise free ends of a common power spring, the fusible-alloy container of said combination being positioned in a cored recess in the sole-plate of said iron, a free air space surrounding said container of fusible-alloy, and a relatively thin section of said sole-plate underneath said alloy container.

7. In overtemperature controls for electric sad-irons of the class described; the combination comprising a fusible-alloy power spring actuated overtemperature controlled electric circuit opening switch mechanism, the power spring of said combination being connected into the mechanism by its two free ends, said power spring being anchored at its central part, the rotatable fusible-alloy controlled shaft of said combination being provided with an enlarged end positioned within the alloy container, said enlarged end of said shaft being surrounded by the said fusible-alloy and in frictional contact with the inner bottom surface of said alloy container.

8. In overtemperature controls for electric sad-irons of the class described; the combination comprising a fusible-alloy, a power spring actuated overtemperature controlled electric circuit opening switch mechanism, a power spring for said combination, said power spring being connected into said mechanism by its two free ends and anchored at its central portion, the fusible-alloy container of the said combination being positioned centrally within a cored recess in the sole-plate of said sad-iron, a free air space surrounding said alloy container, a relatively thin section of said sole-plate underneath said alloy container, said thin section of said sole-plate extending laterally from the bottom of said alloy container, and a loosely connected switch closing lever pivotally secured to the outside structure of the said sad-iron.

9. In overtemperature controls for sad-irons of the class described; the combination comprising a fusible-alloy, a power spring actuated overtemperature switch release mechanism, the power spring of said combination being connected into said mechanism

by its two free ends and retained in position at its central portion, the alloy container of said combination being positioned centrally within a cored recess in said sole-plate, a free air space surrounding said alloy container, a relatively thin section of said sole-plate underneath said alloy container, said thin section of said sole-plate extending laterally beyond the bottom face of said alloy container, and alloy controlled rotatable shaft positioned centrally within said alloy container and extending upward and above said alloy container, an enlarged end on said shaft surrounded by said alloy and in direct contact with the inner bottom surface of said alloy container, the upper portion of said shaft movably supporting the superstructure of said mechanism, and a loosely connected thumb actuated switch closing lever pivotally mounted upon the outside structure of the said sad-iron.

10. In overtemperature controls for electric sad-irons; comprising a cored sole-plate a thin section of sole-plate at the bottom of said cored space, a thermostatic element positioned in said cored space and in firm contact with the top of said thin section at the bottom of said cored space, said thermostatic element being adapted to receive its actuating heat energy from said thin section of said sole-plate.

11. In an overtemperature control for electric sad-irons of the class described; the combination comprising a fusible-alloy a power spring actuated overtemperature switch release mechanism, the power spring of said release mechanism being connected into the combination by its two free ends and anchored in position at its central portion to the insole casing of said sad-iron.

12. In overtemperature controls for electric sad-irons of the class described; the combination comprising a fusible-alloy overtemperature switch release mechanism, the fusible-alloy control for said combination being positioned centrally within a cored recess in the sole-plate of said sad-iron, and a relatively thin section of said sole-plate directly underneath said alloy, and a free air space surrounding said alloy.

13. In an overtemperature control of the character described, having a fusible-alloy for controlling the operation of electric circuit opening mechanism; the combination comprising a container of fusible-alloy, said container adapted to be positioned within a cored recess in the sole-plate of an electric sad-iron, the bottom surface of said container being mounted firmly upon the top surface of a relatively thin section of said sole-plate in the bottom of said cored recess, said thin section of said sole-plate extending laterally from under the bottom surface of said alloy container.

14. In an electric sad-iron having a fusible-alloy controlled overtemperature electric circuit opening mechanism; the combination comprising a thin section of sole-plate structure extending laterally from the alloy container, said alloy container being firmly held against the top of said thin section of said sole-plate.

15. In an overtemperature control of the character described, having a container of fusible-alloy for controlling the operation of electric circuit opening means; the combination comprising a thermally controlled spring actuated electric circuit opening means adapted to be mounted firmly against the bottom of a cored recess in the sole-plate of an electric sad-iron, said cored recess presenting a very thin section of metal adjacent the working face of said sad-iron, said thin section extending laterally to a greater diameter than the diameter of the bottom surface of said alloy container.

16. In an overtemperature control of the character described, having a container of fusible-alloy for controlling the operation of a spring actuated electric circuit opening unit adapted for use in an electrically heated sad-iron; the combination comprising a thermally controlled spring actuated electric circuit opening mechanism adapted to be firmly mounted against the bottom surface of a cored recess in the sole-plate of an electric sad-iron, the electric circuit closing elements of said electric circuit opening means being adapted to be pivotally mounted to the handle support of said electric sad-iron closely adjacent the thumb position of the operator.

17. In an electric sad-iron having a fusible alloy controlled electric circuit opening means; in combination with the fusible-alloy electric circuit opening means, of a thin section of sole-plate structure extending laterally from the bottom of said fusible-alloy container so as to provide an open space around said container, said alloy container contacting with the top central portion of said thin section of said sole-plate structure.

18. In an overtemperature control of the character described, having a container of fusible-alloy for controlling the operation of a spring actuated electric circuit opening unit; said unit being adapted to be firmly mounted against the bottom surface of a cored recess in the sole-plate of an electric sad-iron, the electric circuit closing elements of said electric circuit opening unit being adapted to be pivotally mounted to the handle of said electric sad-iron, the push-button element of said electric circuit closing elements being mounted closely adjacent the position occupied by the thumb of the operator of said electric sad-iron.

19. In an overtemperature control of the character described, having a fusible-alloy

for controlling the operation of an electric circuit opening unit; the combination comprising a container of fusible-alloy, a cover for said alloy container, a shaft extending through said cover, the enlarged end of said shaft being embedded in and surrounded by said alloy, said shaft extending upwardly from said alloy and through said cover, the enlarged end of said shaft being in rotatable and firm contact with the inner bottom surface of said container, a ratchet rigidly secured to said shaft, said shaft and said ratchet pivotally supporting a formed spring actuated element, said formed spring actuated element pivotally supporting toggle-joint electric circuit closing and opening elements, said electric circuit closing elements being pivotally supported to the front outside handle structure of said electric sad-iron, a push-button element secured to the outer and upper end of said electric circuit closing elements, the push-button element of said electric circuit closing elements being positioned closely adjacent the left side of said handle structure.

20. In an overtemperature control of the character described, having a fusible-alloy for controlling the operation of an electric circuit opening unit; the combination comprising a container of fusible-alloy, a perforated element positioned in intimate contact with the top of said alloy, a heat resisting packing positioned on top of said perforated element, a cover above said packing, the lower end of a shaft having an enlarged contacting surface positioned in and surrounded by said alloy, said shaft extending upwardly through said perforated element said packing and said cover, and means for keeping the enlarged end of said shaft firmly against the inner bottom surface of said container.

OWEN DODGE.